Ken KATUMOTO*: On the genus *Coccodiella* Hara

勝本 謙*: コッコディィエラ属について

The genus *Coccodiella* was established by K. Hara in 1911 and has been known to be a monotypic and endemic genus of the Pyrenomycetes in Japan. Being erroneously demonstrated the morphology of ascospores in the description of the type species, *Coccodiella arundinariae* Hara, the characteristics of the genus *Coccodiella* has not been properly recognized by many mycologists, though this error was soon after corrected by the original author.

The writer here wishes to discuss on the taxonomic position and the synonyms of the present genus in accordance with the emended characteristics of the genus.

Morphology The genus *Coccodiella* was for the first time described by Hara³⁾ as follows: "Stroma subcarnate, disciform, planoconvex on the upper surface with a stipe-like appendage at the center of the under surface, dark colored; perithecia immersed, globose, ostiolate; ascus cylindrical, 8-spored, with paraphyses; spore elliptical, 2-septate, hyaline."

The ascospores were later stated by Hara⁵⁾ to be not 2-septate but to be continuous. It may be difficult to confirm the taxonomic position of the genus among the Pyrenomycetes according to Hara's description above mentioned. The accurate principal characteristics of the genus *Coccodiella* shall be here described according to the writer's observation on the type species, *C. arundinariae* Hara.

The hyphae are penetrating into the intercellular portion of mesophyll of the leaves of host plant, septate, and brownish. The stromata are hypophyllous, at first subepidermal, then erumpent and almost superficial in matured condition, gregarious or somewhat sparse, pulvinate to hemiglobose, pseudoparenchymatous, fleshy to subcoriaceous, blackish brown at the cells of outer few layers, grayish at the inner portion, and attached to the host tissue with hypostromata which are subepidermal, prosenchymatous, stipe-like, and blackish brown. The perithecia are arranged in single layer beneath the upper surface of the stromata, subglobose, oblong to flask-shape, opening with papillate ostioles at the apical portion, with periphyses along the ostiolar canal, and composed with the cells which are depressed

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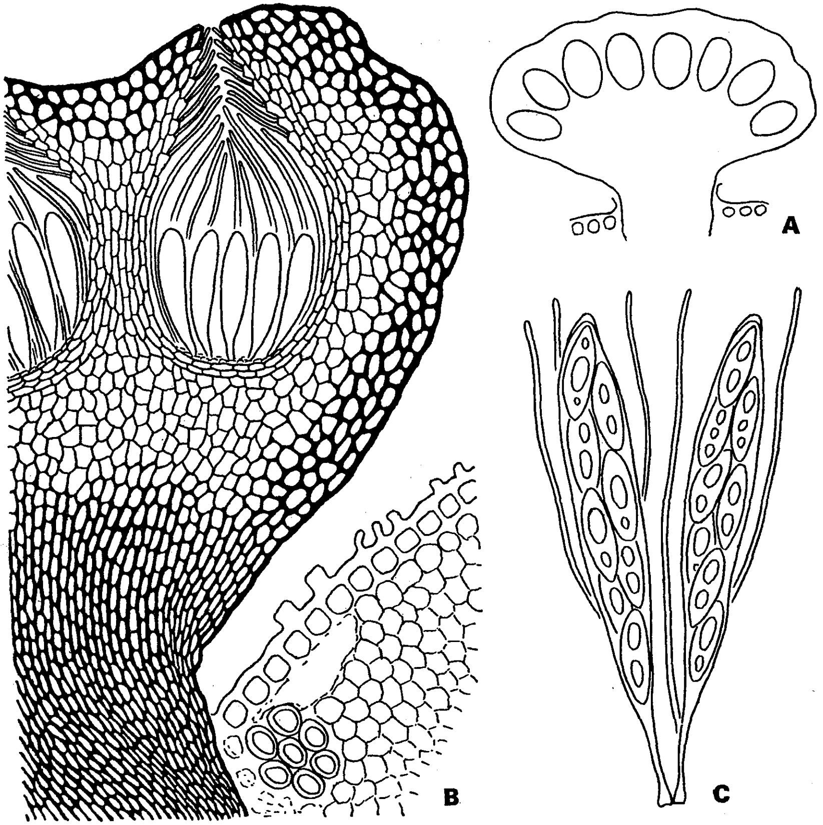

Fig. 1. *Coccodiella arundinariae* Hara. A. Stroma ×10. B. A portion of stroma and perithecium ×300. C. Asci and ascospores ×800.

and hyaline. The asci are clavate or cylindrical, divergent from basal portion of the perithecial cavity, unitunicate, somewhat incrassate at the apex, with short stipes, containing eight ascospores in two rows, and with many paraphyses. The apical portion of the asci shows no reaction with Melzer's reagent. The ascospores are elliptic, oblong to fusoid, continuous, hyaline, smooth, and with drop particles.

Taxonomical discussion At the time of the establishment, the genus *Coccodiella* was regarded by K. Hara³⁾ to be included in the family Coccoideaceae of P. Hennings in respect to the characteristics of the stromata, and was compared with its allied genera, *Coccoidea* P. Henn., *Coccodiscus* P. Henn. and *Yoshinagaia*

P. Henn. The family Coccoideaceae was discussed by Hara[4, 5] in detail, and the genus *Coccodiella* was mentioned by him to possess the continuous ascospores by correcting his former description. The generic name *Coccoidiopsis* was for a time used by Hara[5] for the present genus because of the similarity of "*Coccodiella*" to other generic name "*Coccoidella* v. Höhnel", but later "*Coccodiella*" was again adopted by the same author according to its priority in nomenclature.

The genus *Coccodiella* was later mentioned by F. Theissen and H. Sydow[12] to be included in the subfamily Coccoideae of the family Dothideaceae, and was also included by F. E. Clements and C. L. Shear[2] in the subfamily Dothideae of the family Dothideaceae, though the subfamily Dothideae of Clements and Shear was equivalent to the family Dothideaceae of Theissen and Sydow. In both system of the classification the ascospores of the genus *Coccodiella* was regarded to be 2-septate in spite of Hara's emendation on this matter, and the genus *Yoshinagella* v. Höhnel, which was parasitic on the leaves of oak trees in Japan and surely possessed 3-septated ascospores, was put among the genera of continuous ascospores. The taxonomical position of the genera *Coccodiella* and *Yoshinagella* in the classification of Theissen and Sydow or Clements and Shear should be amended and changed as a matter of course.

Since then the genus *Coccodiella* has been included in Japan into the family Dothideaceae according to the classification of Theissen and Sydow, though the ascospore of the genus was obviously mentioned by Hara[6] or I. Hino[7] to be continuous. The genus, however, has not been properly known in foreign countries because of the former erroneous description of the character of ascospores, and was entirely not mentioned by J.A. von Arx and E. Müller[1] in their monograph of the genera of amerosporous Pyrenomycetes.

The stromata of the genus are parasitic with distinct hypostromata on the leaves of various kinds of bamboos and grass bamboos, and immersed with many perithecia in single layer. The asci are unitunicate, and slightly incrassate at the apex though it seems to have no apical apparatus and to show no reaction with Melzer's reagent. The genus *Coccodiella* seems to belong to the family Polystigmataceae of Sphaeriales in respect to the characters above mentioned, and all characteristics of the genus entirely coincide with those of the genus *Coccostroma*. The genus *Coccostroma* was established by Theissen and Sydow[11] in 1914, and put among the genera of continuous ascospores in the subfamily Coccoideae of the family Dothideaceae. According to Theissen and Sydow the genus *Coccostroma* was merely distinguishable from the genus *Coccodiella* in respect to the spore-septation, and it was already confirmed in this paper that both genera possess continuous and hyaline ascospores. The fungi of the genus *Coccostroma* was already discussed by F. Petrak(10), J.H. Miller and M.G. Burton(9) or von Arx and Müller(1) in detail and described to possess several synonyms. Though the hypostromata of the fungi in this genus are various in morphology, they are indistinguishable from each other from taxonomical view-point, and the system of von Arx and Müller seems to be the most proper in classification of the genus *Coccostroma*. However, the genus *Coccodiella* Hara seems to be prior in nomenclature to the genus *Coccostroma* Theiss. et Syd., and the latter is a synonym of the former.

Coccodiella Hara in Bot. Mag. Tokyo **25**: 224, 1911——Saccardo, Syll. Fung. **22**: 438, 1913——Theissen et Sydow in Ann. Mycol. **13**: 281, 1915.

Coccoidiopsis Hara in Bot. Mag. Tokyo **27**: 62, 1913.

Coccostroma Theissen et Sydow in Ann. Mycol. **12**: 269, 1914.

Bagnisiopsis Theissen et Sydow in Ann. Mycol. **13**: 291, 1915.

Dothidina Theissen et Sydow in Ann. Mycol. **13**: 302, 1915.

Haplostroma Sydow in Ann. Mycol. **14**: 80, 1916.

Causalis Theissen in Ann. Mycol. **16**: 184, 1918.

Phoenicostroma Sydow in Ann. Mycol. **23**: 345, 1925.

Succinaria Sydow in Ann. Mycol. **23**: 363, 1925.

Type species:

Coccodiella arundinariae Hara in Bot. Mag. Tokyo **25**: 224, 1911——Saccardo, Syll. Fung. **22**: 438, 1913——Theissen et Sydow in Ann. Mycol. **13**: 281, 1915——Hino in Bull. Miyazaki Coll. Agr. For. **10**: 56, 1938; Icon. Fung. Bambusicol. Jap. 209, 1961——Imazeki in Asahina's Icon. Kryptog. Jap.: 281, 1939.

Coccoidiopsis arundinariae Hara in Bot. Mag. Tokyo **27**: 62, 1913.

Coccoidea sinobambusae Sawada in Coll. Agr. Nat. Taiwan Univ., Spec. Publ. **8**: 54, 1959.

Coccostromopsis bambusae Sawada, l. c. **8**: 54, 1959.

Though *C. arundinariae* is the type species of the genus *Coccodiella*, it seems to be rather unique species in the genus in respect to the morphology, host range and geographical distribution.

New combinations for 23 species of the fungi which belong to the genus *Coccodiella* are technically described as follows:

1. **Coccodiella advena** (Sydow) Hino et Katumoto, comb. nov.

Bagnisiopsis advena Sydow apud Chardon et Toro in Journ. Dept. Agric. Porto Rico **14**: 244, 1924.——*Coccostroma advenum* (Sydow) v. Arx et Müller, Beitr. Kryptog.-fl. Schw. **11** (1): 267, 1954.

2. **Coccodiella andicola** (Petrak) Hino et Katumoto, comb. nov.
Bagnisiopsis andicola Petrak in Sydowia **4**: 461, 1950.——*Coccostroma andicola* (Petrak) v. Arx et Müller, l.c. 267, 1954.

3. **Coccodiella bactridis** (Rehm) Hino et Katumoto, comb. nov.
Bagnisiella bactridis Rehm in Hedwigia **39**: 231, 1900.——*Coccostroma bactridis* (Rehm) v. Arx et Müller, l.c. 266, 1954.

4. **Coccodiella bullosa** (Rehm) Hino et Katumoto, comb. nov.
Phyllachora peribebuyensis Speg. var. *bullosa* Rehm in Hedwigia, **35**: 368, 1897.——*Coccostroma bullosum* (Rehm) v. Arx et Müller, l.c. 264, 1954.

5. **Coccodiella capparidis** (Mundkur et Ahmad) Hino et Katumoto, comb. nov.
Bagnisiopsis capparidis Mundkur et Ahmad, CMI Mycol. Pap. **18**: 1, 1946. ——*Coccostroma capparidis* (Mundk. et Ahmad) Müller et Ahmad in Biologia, **5**: 15, 1959.

6. **Coccodiella chamaedoreae** (Sydow) Hino et Katumoto, comb. nov.
Phoenicostroma chamaedoreae Sydow in Ann. Mycol. **23**: 345, 1925.——*Coccostroma chamaedoreae* (Sydow) v. Arx et Müller, l.c. 265, 1954.
This is the type species of the genus *Phoenicostroma* Sydow.

7. **Coccodiella depressa** (Sydow) Hino et Katumoto, comb. nov.
Haplostroma depressum Sydow, in Ann. Mycol. **14**: 80, 1916.——*Coccostroma depressum* (Sydow) v. Arx et Müller, l.c. 264, 1954.
This is the type species of the genus *Haplostroma* Sydow.

8. **Coccodiella leandrae** (Sydow) Hino et Katumoto, comb. nov.
Auerswaldia leandrae Sydow in Hedwigia **40**: 2, 1901.——*Dothidina leandrae* (Sydow) Theissen et Sydow in Ann. Mycol. **13**: 302, 1915.——*Coccostroma leandrae* (Sydow) v. Arx et Müller, l.c. 262, 1954.
This is the type species of the genus *Dothidina* Theissen et Sydow.

9. **Coccodiella machaerii** (P. Henn.) Hino et Katumoto, comb. nov.
Phyllachora machaerii P. Henn. in Engl. Bot. Jahrb. **17**: 524, 1893.——*Coccostroma machaerii* (P. Henn.) Theissen et Sydow in Ann. Mycol. **12**: 269, 1914.
This is the type species of the genus *Coccostroma* Theissen et Sydow.

10. **Coccodiella melastomatum** (Lév.) Hino et Katumoto, comb. nov.

Sphaeria melastomatum Lév. in Ann. Sc. nat. 3e ser. **3**: 54, 1845.——*Bagnisiopsis tijucensis* Theissen et Sydow in Ann. Mycol. **13**: 291, 1915.——*Coccostroma melastomatum* (Lév.) v. Arx et Müller, l.c. 260, 1954.

This is the type species of the genus *Bagnisiopsis* Theissen et Sydow.

11. **Coccodiella miconiae** (Duby) Hino et Katumoto, comb. nov.

Sphaeria miconiae Duby in Mem. soc. phys. et hist. nat. Genève **7**: 405, 1835. ——*Coccostroma miconiae* (Duby) v. Arx et Müller, l.c. 263, 1954.

12. **Coccodiella miconicola** (Orejuela) Hino et Katumoto, comb. nov.

Bagnisiopsis miconicola Orejuela, Mycologia, **36**: 456, 1944.

Coccostroma miconicola (Orej.) v. Arx et Müller, l.c.: 263, 1954.

13. **Coccodiella minuta** (Sydow) Hino et Katumoto, comb. nov.

Succinaria minuta Sydow in Ann. Mycol. **23**: 363, 1925.——*Coccostroma minutum* (Sydow) v. Arx et Müller, l.c. 264, 1954.

This is the type species of the genus *Succinaria* Sydow.

14. **Coccodiella myrtacearum** (Rick) Hino et Katumoto, comb. nov.

Pseudorhytisma myrtacearum Rick in Broteria **5**: 38, 1906.——*Causalis myrtacearum* (Rick) Theissen in Ann. Myc. **16**: 184, 1918.——*Coccostroma myrtacearum* (Rick) v. Arx et Müller, l.c. 259, 1954.

This is the type species of the genus *Causalis* Theissen.

15. **Coccodiella nervisequens** (Petrak et Ciferri) Hino et Katumoto, comb. nov.

Bagnisiopsis nervisequens Petrak et Ciferri in Ann. Mycol. **30**: 165, 1932.—— *Coccostroma nervisequens* (Petrak et Ciferri) v. Arx et Müller, l.c. 266, 1954.

16. **Coccodiella neurophila** (Theissen) Hino et Katumoto, comb. nov.

Epiphyma neurophilum Theissen in Ann. Mycol. **14**: 404, 1916.——*Coccostroma neurophilum* (Theissen) v. Arx et Müller, l.c. 263, 1954.

17. **Coccodiella nuda** (F. L. Stevens) Hino et Katumoto, comb. nov.

Yoshinagella nuda F. L. Stevens in Bernice P. Bishop Mus. Bull. **19**: 16, 1925.

Coccostroma nudum (F. L. Stevens) v. Arx et Müller, l.c. 266, 1954.

Though the present fungus was for the first time described by Stevens to belong to the genus *Yoshinagella* according to the classification of Theissen and Sydow, it has been surely to be included in the genus *Coccodiella* with regard to the spore-septation of the fungus.

18. **Coccodiella peribebuyensis** (Speg.) Hino et Katumoto, comb. nov.

Phyllachora peribebuyensis Speg. in Anal. soc. sc. Argent. **19**: 244, 1886.—— *Coccostroma peribebuyense* (Speg.) v. Arx et Müller, l.c. 262, 1954.

19. **Coccodiella petrakii** (Ciferri) Hino et Katumoto, comb. nov.
Bagnisiopsis petrakii Ciferri apud Petrak et Ciferri in Ann. Mycol. **30**: 166, 1932.——*Coccostroma petrakii* (Cif.) v. Arx et Müller, l.c. 266, 1954.

20. **Coccodiella polymorpha** (F. L. Stevens) Hino et Katumoto, comb. nov.
Yoshinagella polymorpha F. L. Stevens in Bernice P. Bishop Mus. Bull. **19**: 14, 1925.——*Coccostroma polymorphum* (F. L. Stevens) v. Arx et Müller, l.c. 266, 1954.

21. **Coccodiella puttemansii** (P. Henn.) Hino et Katumoto, comb. nov.
Auerswaldia puttemansii P. Henn. in Hedwigia **41**: 111, 1902.——*Coccostroma puttemansii* (P. Henn.) Theiss. et Syd. in Ann. Mycol. **13**: 271, 1915.

22. **Coccodiella toledoi** (Chardon) Hino et Katumoto, comb. nov.
Bagnisiopsis toledoi Chardon, Myc. Expl. Ven. Monogr. Univ. Puerto Rico, ser. B., **2**: 137, 1934.——*Coccostroma toledoi* (Chardon) v. Arx et Müller, l.c. 263, 1954.

23. **Coccodiella translucens** (Miller et Burton) Hino et Katumoto, comb. nov.
Bagnisiopsis translucens Miller et Burton in Mycologia **35**: 330, 1943.——*Coccostroma translucens* (Miller et Burton) v. Arx et Müller, l.c. 264, 1954.

Coccostroma palmicola (Speg.) v. Arx et Müller (l.c.: 264, 1954) was also included by von Arx and Müller in the genus *Coccostroma*, but the fungus was already mentioned by P. Joly⁸⁾ to be synonymous with *Sphaerodothis acrocomiae* (Mont.) v. Arx et Müller.

Almost all species of the genus *Coccodiella* are leaf-parasitic and distributed in South and Central America, and a unique species, *C. capparidis*, is said to be found on the branches of *Capparis aphylla* Roth. in India and Pakistan.

References

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10 D: 187-193, 1961. 9. Miller, J. H. and M. G. Burton: Study of *Bagnisiopsis* species on the Melastomataceae in Mycologia **35**: 312-334, 1943. 10. Petrak, F.: Über *Bagnisiopsis* und verwandte Gattungen in Hedwigia, **68**: 251-290, 1928. 11. Theissen, F. and H. Sydow: Dothideaceen-Studien II in Ann. Mycol. **12**: 268-281, 1914. 12. —— and ——: Die Dothideales in Ann. Mycol. **13**: 149-746, 1915.

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Coccodiella 属は1911年に原摂祐によって設立され，1属1種で日本特産の菌類の属として取り扱われてきた。*Coccodiella* 属の子嚢胞子は最初3細胞からなるとして記載され，のち原自身によってこれが訂正されて単細胞からなることが明らかにされたが，外国の学者には誤まったまま伝えられていた。子嚢は単膜の構造からなり，頂部はやや肥厚するが沃度には反応を示さず，また特別の頂部構造も認められない。これらの子嚢，子嚢胞子，あるいは子座，子嚢殻などの形態からみて，*Coccodiella* 属は Sphaeriales 中の Polystigmataceae に属し，しかも従来知られている *Coccostroma* Theissen et Sydow (1914) とまったく区別することができない。したがってこの両属はたがいに synonym の関係にあると考えられるので，先名権によって *Coccodiella* を採用し，この属に入るべき基準種以外の23種の菌類について新組合せを行なった。

Coccodiella 属の菌類はほとんど南アメリカないし中央アメリカに産し，種々の植物の葉に寄生するが，*C. capparidis* のみはインドおよびパキスタンに産して *Capparis* 属の植物の枝に寄生し，日本および台湾に分布して種々のタケ，ササ類の葉に寄生する基準種 *C. arundinariae* とともに特異な種類である。

□ G. F. Leedale: **Euglenoid flagellates.** pp. 242 Prentice-Hall, Inc. Englewood Cliffs, N. J. U.S.A. (1966). $6.95. 著者は英国リーヅ大学教授。この類の細胞分裂の研究者。前三分の一は分類を扱い新たに6目に分ち，その下の科，属と主な種を網羅し，よく整理された記述と，多少模式的だが分りよい図解で解説する。残り三分の二は核，外皮，endoplasmic reticulum，口，べん毛，眼点，収縮胞，ゴルジ体，ミトコンドリア，リソゾーム，葉緑体，ピレノイド，パラミロン，消化胞などの細胞器官を，片はしから見事な電顕，あるいは位相差顕微鏡写真を縦横につかって記述する。美しいと同時に細胞の妙を満喫するによい。11本のフィブリルを押しひろげたべん毛の分解線など感嘆を禁じえない。　（前川文夫）